REMARKS:

SPECIFICATION OBJECTIONS

Specification Amendments

The Examiner has objected to the phrase "...selenium rectifying plate in parallel connection" on page 1, line 15. In response, the applicants have amended the specification on page 1 line 15 to make it clear that "selenium rectifying plates" are an example of "plate-like semiconductor materials" that may be "in series connection." The applicants submit that this amendment merely makes explicit that which was implicit in the specification as filed. As such, no new matter has been entered with this amendment. The Examiner has noted the use of the trademark "kovar" in the application and has requested that "kovar" be capitalized. In response, the applicants have amended three paragraphs on page 8 of the specification to rewrite kovar- as Kovar®. The applicants submit that no new matter has been added with these amendments.

CLAIM OBJECTIONS

The Examiner objected to claims 1-18 for various informalities. In response the Applicants have made amendments to claims **1**, **6**, **9**, **10**, **13**, and **14** addressing these informalities along the lines recommended by the Examiner. The Applicants submit that the above-referenced amendments to claims **1**, **6**, **9**, **10**, **13**, and **14** merely make explicit that which was implicit in the claims as originally filed. As such, these amendments do not narrow any limitations of these claims within the meaning of *Festo Corp. v. Shoketsu Kogyo Kabushiki Co., Ltd., 234 F3d 558, 566, 56 U.S.P.Q.2d 1865 (Fed. Cir. 2000), 535 U.S. 722, 152 L. Ed. 2d 944, 122 S. Ct. 1831, (US Supreme Court 2002)* (hereinafter *Festo*).

CLAIM REJECTIONS

35 USC 112

The Examiner has rejected claims **1-5** and **7-18**, under 35 U.S.C. 112. The applicants submit that the rejections of claims **7** and **18** are moot since these claims have been canceled. With respect to the remaining claims:

Claim **17** was rejected for failing to comply with the enablement requirement of 35 USC 112, first paragraph. The Examiner states that there is no disclosure of what materials the Applicant has contemplated using that is a liquid and exhibits semiconductive properties. The Examiner further states that the Applicant has failed to disclose how such a liquid could be incorporated into the parallel plate diode. The Examiner argues that one of ordinary skill in the art would be required to perform undue experimentation to reduce the claimed invention to practice.

In response the Applicants submit that liquid semiconductor materials are well known to those skilled in the semiconductor art (see p. 6, lines 18-29 of the specification). Furthermore, claim 17 depends from claim 1, which recites that "*concentration of the carriers in the semiconductor material layer is 20% or less than that of the electrons in the metal.*" The Applicants submit that one of skill in the art can readily determine combinations of liquid semiconductors and metal electrodes that satisfy these criteria. As such, no undue experimentation is necessary and claim 17 is enabled as it presently stands in the application.

The Examiner has rejected claims **1-5** and **7-18** under 35 USC 112, second paragraph, as being indefinite. Specifically, with respect to claims **1**, **8**, **10**, and **12**, the Examiner has cited lack of antecedent basis for "the two thin plate electrodes" and "the semiconductor layer" in claim **1**. In addition, the Examiner has cited lack of antecedent basis for "the insulated substrate" in claim **8**, "of each diode", "the germanium electrode", "the adjoining electrode", and "the well shape cavity" in claim **10** and "the other diode" in claim **12**.

In response, the Applicants have amended claims **1**, **8**, **10**, and **12** to address these antecedent basis problems.

The Examiner also states that "..convex portions and concave portions are staggered each other" in claim **5** doesn't make sense. In response the Applicants have amended claim **5** to recite "an array of convex portions and concave portions."

The Examiner has rejected claims **11** and **12** as being indefinite for including the trademark KOVAR. In response the applicants have amended claim **11** to change "by kovar alloy" to -- from an alloy of iron, nickel and cobalt having a thermal expansion coefficient of about $3X10^{-6}$ --. Furthermore, the Applicants have amended claim **12** to change "kovar" to --metal--. The Applicants submit that Kovar alloy has a well-known meaning to those of skill in the art. For example, http://www.hightempmetals.com/techdata/hitempKovardata.php4 defines Kovar alloy as "a vacuum melted, iron-nickel-cobalt, low expansion alloy whose chemical composition is controlled within narrow limits to assure precise uniform thermal expansion properties." The same reference specifies maximum percentage amounts of nickel, cobalt, carbon, silicon and manganese in the alloy. In addition, the $3X10^{-6}$ thermal expansion coefficient is specified at page 8, line 6 of the specification.

Finally, the Examiner states that it is not clear in claim **13** if the "one side" is the same as "the side" mentioned in claim **1** or how to determine which side "one side" refers to. In response the Applications have amended claim **13** to recite that

> "there are recesses on the ~~surface~~ surfaces where the two metal electrodes that make up the parallel plate diode contact the semiconductor material, wherein average diameter of the recesses on one side of the semiconductor material is equal to or smaller than 0.7 micrometer while the average diameter of the recesses on the other side is bigger than 0.7 micrometer."

The Applicants submit that it is clear that "one side" refers to the electrode on one side of the semiconductor material sandwiched between the electrodes and that the "other side" logically refers to the electrode on the other side of the semiconductor material.

The Applicants submit that the above-referenced amendments to claims **1**, **5**, **8**, **11**, **10**, **12** and **13** merely make explicit that which was implicit in the claims as originally filed. As such, these amendments do not narrow any limitations of these claims within the meaning of *Festo*.

35 USC 103

Claims **1-4**, **7-9**, **11**, and **16** were rejected under 35 U.S.C. §103, as being obvious over US Patent 5,365,102 to Mehrotra et al. (hereinafter, Mehrotra). The Examiner says that Mehrotra teaches, in Fig. 6F) a parallel plate diode, comprising metal electrodes, semiconductor material contacting the metal electrodes and a plurality of recesses in one of the metal electrodes, wherein the recesses are in a surface contacting the semiconductor material. The Examiner admits that Mehrotra does not explicitly teach that the concentration of carriers in the semiconductor material is 20% or less than that of the electrons in the metal. The Examiner argues that the device taught by Mehrotra would have inherently had this feature since the material is identical to that of the claimed invention.

The Applicants respectfully traverse the rejections. The rejections of claims **7** and **16** are moot due to their cancellation. The Applicants further submit that the present invention as embodied in the claims is different from that described by Mehrotra. Specifically, Mehrotra describes the same structure as a convention diode described in the background of the present application. Mehrotra's diode has a p-n junction structure made of semiconductor materials in which the carriers make oriented movements when extra electric field force is applied and they exhibit unidirectional conductivity. Furthermore, the Applicants submit that, even if, arguendo, Mehrotra teaches similar materials for his diode, the doping concentrations are very different. Specifically, the Applicants submit that the concentration of the carriers in the semiconductor material layer of Mehrotra is less than 0.1% of the electron concentration in Mehrotra's metal layer. Furthermore, Mehrotra's recesses have insulating material 16a, 16b on the sides of the walls. This insulating material would interfere with generation of current by the recess. As such, Mehrotra does not teach or suggest, and teaches away from, all the features of claim **1** as it presently stands in the Application and a prima facie case of obviousness is not present.

The Applicant submits that claims **2-4**, **7-9** and **11** depend, either directly or indirectly from claim **1** and recite additional features therefor. For the reasons set forth above, the combination of Mehrotra with skill in the art does not teach all the limitations of claim **1**. Therefore, no combination of Mehrotra with skill in the art teaches all the limitations of dependent claims **2-4**, **7-9**, and **11**. Therefore, these dependent claims define an invention suitable for patent protection.

Furthermore, with respect to claim **13**, the Applicants submit that Mehrotra is silent as to the diameter of the recesses. Furthermore, Mehrotra neither teaches nor suggests recesses on the electrodes on both sides of the semiconductor material as recited in claim **13**. As such, Mehrotra does not teach or suggest all the limitations of claim **13**.

CONCLUSION

For the reasons set forth above, the Applicant submits that all claims are allowable over the cited art and define an invention suitable for patent protection. Furthermore, for the reasons set forth above, the Applicant submits that the claims are enabled and are neither vague nor indefinite. The Applicants therefore respectfully request that the Examiner enter the amendment, reconsider the application, and issue a Notice of Allowance in the next Office Action.

Respectfully submitted,

Joshua D. Isenberg

Joshua D. Isenberg
Reg. No. 41,088
Patent Agent

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JDI PATENT
204 Castro Lane
Fremont, CA 94539
tel.: (510) 896-8328
fax.: (510) 360-9656